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Status of Privately Owned Harvested Timberland in East Texas, 1975–1986

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SUMMARY

Harvesting was conducted on 4.7 million acres, or 43 percent of the privately owned timberland, in east Texas between 1975 and 1986. Cutting was most intensive on forest industry lands, where 59 percent of the total timberland base underwent some form of harvesting. Seventy-nine percent of the pine and mixed pine-hardwood stands receiving heavy cutting exhibited an adequate level of pine stocking following harvest.

Additional keywords: Clearcut, partial cut, pine regeneration, forest-type transition, timber supply.

INTRODUCTION

The Forest Inventory and Analysis Unit (FIA) of the Southern Forest Experiment Station conducts periodic inventories of forest resources in the Midsouth region of the United States. An important component of these surveys is the collection of information on harvesting practices and the success of pine regeneration following harvest (McWilliams and Frey 1986). Monitoring pine regeneration is especially important due to recent findings of declining pine-type acreage, a decrease in the softwood inventory in southeast Texas, and similar findings for the Midsouth region (McWilliams and Bertelson 1986; USDA FS 1982). The findings for stands harvested on privately owned timberland since a 1975 survey of east Texas forests are summarized in this Research Note.

DATA COLLECTION

Data were collected during the 1986 inventory of east Texas; the area covered is shown in figure 1. Forest acreage and timber volume data were secured by a systematic sampling method involving a forest-nonforest classification on aerial photographs and on-the-ground measurements of trees at sample locations. The sample locations were at intersections of a grid of lines spaced 3 miles apart. On-the-ground measurements included collection of data describing crop tree removals, management activity, natural disturbance, and the stocking of well established pine seedlings (6 inches or greater in height). Sample locations were assigned a code describing any harvest that had taken place since the previous measurement. Field crews used existing plot conditions along with personal judgment to distinguish between harvesting and other management activities such as commercial thinning, precommercial thinning, or stand improvement cuttings.

HARVESTING

Forty-three percent of the 10.8 million acres of privately owned timberland in east Texas showed evidence of crop tree removal since 1975 (table 1). This included any acreage that had undergone clearcutting or seed tree, shelterwood, or partial cutting (see Definition of Terms section). Acreage that received stand improvement cuts and poletimber stands that underwent thinning are excluded. Forest industry timberland was most heavily impacted by cutting, with 2.2 million acres or 53 percent of their total forest being affected. Of the nonindustrial private stands, 2.4 million acres (35 percent) showed evidence of harvesting.

Pine types were cut most heavily, receiving nearly half the harvesting. The 2.2 million acres harvested represents 53 percent of the 1975 total privately owned pine type timberland in east Texas. The rest of the harvesting

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ORIGINAL COMPLETED

Figure 1.—The forest survey regions of east Texas.

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Table 1.—*Area of timberland harvested[1] by ownership class, past forest type, and method of harvest for private owners, east Texas, 1975–1986*

Ownership class and past forest type	Total past timberland	Total timberland harvested	Method of harvest		
			Clearcuts	Seed tree and shelterwood cuts	Partial cuts[2]
	Thousand acres				
Forest industry					
Pine types	1,825.1	1,208.3	630.2	36.5	539.6
Mixed pine-hardwoods	1,128.1	597.0	310.5	17.7	268.8
Hardwood types	881.6	462.6	250.5	....	212.1
Total	3,834.8	2,265.9	1,191.2	54.2	1,020.5
Nonindustrial private					
Pine types	2,302.4	983.7	156.4	29.7	777.6
Mixed pine-hardwoods	2,839.4	301.9	92.3	6.4	503.2
Hardwood types	1,543.0	857.8	142.0	6.0	709.8
Total	6,984.8	2,423.4	390.7	42.1	1,990.6
Total private					
Pine types	4,127.5	2,170.0	786.6	66.2	1,317.2
Mixed pine-hardwoods	3,967.5	1,198.9	402.8	24.1	772.0
Hardwood types	2,724.6	1,320.4	392.5	6.0	921.9
Total	10,819.6	4,689.3	1,581.9	93.3	3,011.1

[1]Excludes precommercial thinnings, commercial thinnings in poletimber stands, and single-tree selection.
[2]Includes pine-selection, diameter-limit, and salvage cuts. Thinnings in poletimber stands are excluded; heavy thinnings of dominant trees in sawtimber stands are included.

was split between the mixed pine-hardwood and hardwood forest types.

Partial cutting was the most prevalent harvesting practice, found on 64 percent of the privately owned harvested area. Partial cuts consist of selection methods, such as pine-selection and diameter-limit cuts, and salvage operations removing groups of trees damaged by insects, disease, wind, or other destructive agents. Partial cut acreage includes sawtimber-size stands that received heavy thinnings of trees in the dominant stand. Nearly all of the remaining harvested acreage was clearcut. Seed tree and shelterwood cuts were used on 2 percent of the harvested acreage.

Distinct differences in cutting practices showed up between the two ownership classes. Clearcuts were much more common on forest industry property. Fifty-three percent of the harvesting on forest industry land involved clearcutting compared with only 16 percent for nonindustrial owners. Nonindustrial owners showed a preference for partial cutting by using such methods 62 percent of the time.

Another difference between ownerships was apparent in the type of clearcut used. Classification of clearcuts includes the distinction between complete and merchantable clearcuts. Complete clearcuts remove all trees from a site, including rough and rotten stems. Merchantable clearcuts leave nonmerchantable trees standing. These residuals can make regeneration more difficult, and they tend to provide an inferior seed source for the future stand. Three-fourths of the clearcuts on nonindustrial private land left nonmerchantable trees standing. In contrast, 79 percent of the forest industry clearcuts removed all trees.

PINE REGENERATION

Stocking is quantified by comparing existing tree stocking, in terms of number of trees or basal area, to a "normal" stocking standard (see Definition of Terms section). Forest Survey plots are characterized as understocked or overstocked in relation to this standard. Pine regeneration on harvested sites can be assessed by examining the degree of pine stocking following cutting. The extent of pine regeneration in harvested pine and mixed pine-hardwood stands is an important factor affecting future pine timber supplies. The data indicates that 57 percent of the 3.3 million acres of pine and mixed pine-hardwood stands receiving heavy cutting (including clearcuts and partial cuts) showed a high stocking of pine. An additional 22 percent were in the medium pine stocking class. Forest industry had 66 percent in the high pine stocking class, while nonindustrial private owners had 46 percent (fig. 2).

The findings for clearcut acreage show that 59 percent of the timberland in pine and mixed pine-hardwoods had high stocking of pine, and an additional 16 percent had medium stocking (table 2). The two ownerships had varying success at reforesting clearcuts with pine. Two-thirds of the forest industry clearcuts were classified as

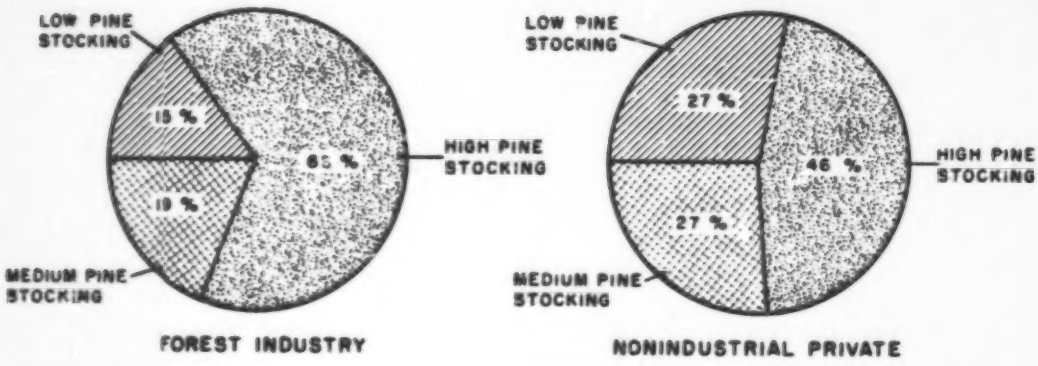

Figure 2.—*Status of privately owned pine and mixed pine-hardwood type timberland harvested by clearcuts and partial cuts, east Texas, 1975–1986.*

having high pine stocking compared to less than one-third for nonindustrial private owners. Some of the 303,500 acres in pine and mixed pine-hardwoods with low pine stocking have recently been cut and may be scheduled for regeneration in the future.

Conversion of hardwood to pine showed up on forest industry property where 58 percent of the clearcut hardwood type timberland exhibited high or medium pine stocking. Such conversion was not apparent on nonindustrial timberland where 87 percent of the clearcut hardwood acreage had low pine stocking.

Pine stocking tended to be higher on partial-cut sites than clearcut sites (table 3). Natural seeding from adjacent pines and existing residual stems contribute to overall pine stocking of the stand. Fifty-six percent of the partial-cut stands in the pine and mixed pine-hardwood types had high pine stocking and 26 percent had medium stocking (a total of 82 percent compared to 75 percent after clearcutting). Nonindustrial owners had more success at regenerating after partial cutting than after clearcutting. Forty-nine percent of the nonindustrial partial cuts in pine and mixed pine-hardwood types had high pine stocking compared to 28 percent following clearcutting.

FOREST-TYPE TRANSITION

One issue related to harvesting, especially partial cutting, involves forest-type transition. Selective cutting practices tend to remove the pine component, leaving hardwoods and nonmerchantable pines on sites that previously supported pine forest types. This can cause a shift toward hardwood types and therefore a net loss of pine forests. Thirty-seven percent of the pine type acreage shifted to mixed pine-hardwood and hardwood forest types (table 4). Some timberland shifted toward pine types; the net effect of partial cutting was a shift of about 387,900 acres out of the pure pine type. Two-thirds of this loss occurred on nonindustrial timberland.

Table 2.—*Area of timberland harvested using clearcuts by ownership class, past forest type, and pine stocking class for private owners, east Texas, 1975–1986*

Ownership class and past forest type	Total	Pine stocking class[1]		
		Low	Medium	High
	Thousand acres			
Forest industry				
Pine types	630.1	108.5	108.8	412.8
Mixed pine-hardwoods	310.5	65.1	35.1	210.3
Hardwood types	250.6	104.4	47.2	99.0
Total	1,191.2	278.0	191.1	722.1
Nonindustrial private				
Pine types	156.5	77.9	30.8	47.7
Mixed pine-hardwoods	92.3	52.0	11.4	28.9
Hardwood types	142.0	123.8	6.1	12.1
Total	390.7	253.7	48.3	88.7
Total private				
Pine types	786.5	186.4	139.6	460.5
Mixed pine-hardwoods	402.8	117.1	46.5	239.2
Hardwood types	392.6	228.2	53.3	111.1
Total	1,581.9	531.7	239.4	810.8

[1]Low indicates 0–29 percent stocked with pine (all size classes), medium indicates 30–59 percent stocked with pine (all size classes), and high indicates 60 percent or greater stocked with pine (all size classes).

CONCLUSIONS

The status of pine regeneration on harvested timberland in east Texas appears favorable. Pine stocking on cut sites was highest on forest industry properties. However, the heavy cutting that has occurred on forest industry lands may affect the balance of growth and removals of the forest. Sixty-two percent of the 681,700 acres of

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Table 3.—*Area of timberland harvested using partial cuts[1] by ownership class, past forest type, and pine stocking class for private owners, east Texas, 1975–1986*

Ownership class and past forest type	Total	Pine stocking class[2]		
		Low	Medium	High
	Thousand acres			
Forest industry				
Pine types	539.6	29.4	118.8	391.4
Mixed pine-hardwoods	268.8	59.4	69.6	139.8
Hardwood types	212.1	158.2	30.4	23.5
Total	1,020.5	247.0	218.8	554.7
Nonindustrial private				
Pine types	777.7	109.2	142.1	526.4
Mixed pine-hardwoods	503.1	180.2	220.9	102.0
Hardwood types	709.8	599.3	104.6	5.9
Total	1,990.6	888.7	467.8	634.3
Total private				
Pine types	1,317.3	138.6	260.9	917.8
Mixed pine-hardwoods	771.9	239.6	290.5	241.8
Hardwood types	921.9	757.5	135.0	29.4
Total	3,011.1	1,135.7	686.4	1,189.0

[1]Includes pine-selection, diameter-limit, and salvage cuts. Thinnings in poletimber stands are excluded; heavy thinnings of dominant trees in sawtimber stands are included.

[2]Low indicates 0–29 percent stocked with pine (all size classes), medium indicates 30–59 percent stocked with pine (all size classes), and high indicates 60 percent or greater stocked with pine (all size classes).

Table 4.—*Area of timberland harvested using partial cuts[1] by ownership class, past forest type, and present forest type for private owners, east Texas, 1975–1986*

Ownership class and past forest type	Total	Present forest type		
		Pine types	Mixed pine-hardwoods	Hardwood types
	Thousand acres			
Forest industry				
Pine types	539.6	351.2	135.6	52.8
Mixed pine-hardwoods	268.8	58.1	128.4	82.3
Hardwood types	212.1	5.9	24.1	182.1
Total	1,020.5	415.2	288.1	317.2
Nonindustrial private				
Pine types	777.6	476.0	150.9	150.7
Mixed pine-hardwoods	503.2	38.1	238.0	227.1
Hardwood types	709.8	.....	41.6	668.2
Total	1,990.6	514.1	430.5	1,046.0
Total private				
Pine types	1,317.2	827.2	286.5	203.5
Mixed pine-hardwoods	772.0	96.2	366.4	309.4
Hardwood types	921.9	5.9	65.7	850.3
Total	3,011.1	929.3	718.6	1,363.2

[1]Includes pine-selection, diameter-limit, and salvage cuts. Thinnings in poletimber stands are excluded; heavy thinnings of dominant trees in sawtimber stands are included.

pine and mixed pine-hardwood type timberland in the lowest pine stocking class is held by nonindustrial owners. Regeneration of this timberland is important for pine timber supplies of the future.

DEFINITION OF TERMS

FIA.—Forest Inventory and Analysis unit of the U.S. Department of Agriculture, Forest Service, Southern Forest Experiment Station.

Forest type.—A classification of FIA plots according to the relative stocking of pine and hardwood trees tallied.

Pine: Forests in which pine species comprise the plurality of all live tree stocking.

Mixed pine-hardwoods: Forests in which pines comprise 25 to 50 percent of the stocking, and hardwood species comprise the plurality of all live tree stocking.

Hardwood: Forests in which hardwood species, singly or in combination, comprise a plurality of all live tree stocking, except where pines comprise 25 to 50 percent of the stocking (see previous definition for mixed pine-hardwoods).

Harvesting.—A classification assigned to FIA plots that have undergone some form of crop tree removal since the last survey. Precommercial thinnings, commercial thinnings in poletimber stands, and the removal of a small number of trees for firewood, posts, or other products are excluded.

Clearcut: Stands that undergo removal of all utilizable and/or nonutilizable trees.

Seed tree and shelterwood cuts: Heavy cutting of a stand with a small number of crop trees left to provide seed or shade to establish a new stand.

Partial cut: Pine-selection cuts, diameter-limit cutting, highgrading, or any other sawtimber cutting practice that leaves a residual stand of potential crop trees and/or cull trees. Thinnings in poletimber stands are excluded; heavy thinnings of dominant trees in sawtimber stands are included.

Salvage: Removal of damaged or salvable dead trees, often leaving a gap in the stand.

Pine stocking class.—A classification of timberland according to the degree of live pine tree stocking. All size classes are included.

High stocking: 60 percent or greater stocked with pine.

Medium stocking: 30 to 59 percent stocked with pine.

Low stocking: 0 to 29 percent stocked with pine.

Stocking.—A measurement of the extent to which the growth potential of the site is utilized by trees or preempted by vegetative cover. Stocking is determined by comparing the stand density in terms of number of trees or basal area with a specified standard. The tabulation below shows the density standard in terms of trees per acre, by size class, required for full stocking:

D.b.h. (inches)	Number of trees per acre
seedlings	600
2	560
4	460
6	340
8	240
10	155
12	115
14	90
16	72
18	60
20	51
22	42
24	36
26	31
28	27
30	24

Timberland.—Land at least 16.7 percent stocked by forest trees of any size, or formerly having such tree cover, capable of producing crops of industrial wood. Land that is currently developed for nonforest use or withdrawn from timber utilization through statute or administrative regulation is excluded.

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